

REMARKS

Applicant respectfully requests consideration of the subject application as amended herein. This Amendment is submitted in response to the Final Office Action mailed on March 11, 2005. Claims 13, 17-22 and 27-31 are rejected. Claim 13 has been amended. No new matter has been added by this Amendment.

35 U.S.C. § 102(e)

Claims 13, 18, 19, 21, 22, 27, 30, and 31 are rejected under 35 U.S.C. § 102(e) as being anticipated by Suzuki (U.S. Patent No. 6,232,638, hereinafter “Suzuki”). Applicant respectfully disagrees.

Suzuki did not teach, disclose, or even suggest each and every element of claims 13, 18, 19, 21, 22, 27, 30, and 31.

Applicant has amended the Claim 13 to clearly point out that the recess is “disposed immediately adjacent to the emitter stack” and that “the emitter stack and the recess share a boundary.” The recess 137 can be seen, for example, in Figures 3-5 of Applicant disclosure.

Applicant’s invention as recited in the pending claims is different from Suzuki. Suzuki did not teach a recess disposed adjacent or immediately adjacent the emitter stack. As the Examiner pointed out, the recess 116a can be viewed from Figures 4a-4d of Suzuki. Clearly, the recess 116a is actually immediately adjacent to the Isolation region 102. Additionally, the recess 116a is between two isolation regions 102 and NOT between an isolation region and the emitter stack 114. In Suzuki, the recess 116a is separated from the emitter stack 114 by the isolation region 102.

As the Examiner pointed out, in Suzuki, “the recess 116a is formed between two isolation regions 102, in detail, between the first isolation region to the far right and the

second isolation region which is sandwiched between the emitter stack 114 and the recess 116 in Figure 4d.” (See Final Office Action, page 5). The recess 116a is NOT immediately adjacent the emitter stack and IS between the two isolation regions.

Applicant’s invention as recited in the pending claims is distinguished from Suzuki in that the recess is formed immediately adjacent to the emitter stack such that they share one boundary (see Applicant’s Specification, page 6, for example). In other words, a traditional isolation region that is typically located between the emitter edge and the edge of the recess (that forms a collector tab) is removed. This is possible because the recess that forms the collector tab is immediately adjacent the emitter stack. As taught in the Specification, Applicant disclosed a self-aligned process that allows the recess to be placed immediately adjacent the emitter stack. No isolation region is between the emitter stack and the recess.

A device formed using Suzuki would need the isolation region between the emitter stack and the recess because in Suzuki, a self-aligned process is not used to form the recess 116a. The isolation region would provide registration tolerance for the formation of the recess 116a.

Applicant submits Exhibit A to help the Examiner understands that difference between Suzuki and Applicant’s invention. One reason for Applicant’s invention being able to have the recess deposited immediately adjacent the emitter stack where the emitter stack and the recess share a boundary is Applicant’s invention utilized a self-aligned recess.

In Figures 1-2 of Exhibit A, Applicant shows for clarification a non-self aligned process of etching that is used in Suzuki. In Figures 1-2, a photoresist mask is formed and implantation is done to form source/drain regions in the silicon substrate. Here,

depending on how the mask is aligned, the source and drain regions may be uniform or not. This process relied heavily on alignment and accuracy of the forming of the mask.

In Figures 3-6, another non-self aligned process is used to make a device. In Figure 3, a gate is formed and a mask is then formed on top of the gate wherein the mask defines the gate. Implantation is done to form the device shown in Figure 4 where the polysilicon gate is formed. If the mask used to form the polysilicon gate is misaligned as is shown in Figure 5, the device shown Figure 6 will be formed where the source and drain regions are non-uniform and the device is defective.

Figures 7-8 illustrate a simple self-aligned process. A polysicon gate is formed over the substrate and over the source and drain regions as shown in Figure 7. A photoresist mask is also formed that define regions to be implanted. Here, the polysilicon gate is also used as a “mask” that define the implantation regions (Figure 7). The alignment is easier in the this case. The photoresist mask can tolerate a bigger window of error in misalignment. The implant aligns itself to the polysilicon gate, thus the process is termed self-aligned. The source and drain regions are formed by self-alignment with respect to the polysilicon gate.

In Applicant’s invention (e.g., Figure 4 of Applicant’s invention), the mask 134 and the emitter stack 126 act to self-align the recess 138. Alignment is easier to control. There is thus no need for an isolation region to be formed between the recess 138 and the emitter stack 126 to account for misalignment when the recess 138 is formed. The etch and implant steps are both self aligned to ONE edge of the emitter stack 126.

Therefore, Suzuki ‘638 cannot anticipate claims 13, 18, 19, 21, 22, 27, 30, and 31.

35 U.S.C. § 103(a)

Claims 20, 28, and 29 are rejected under 35 U.S.C. § 103(a) as being obvious over Suzuki.

Applicant respectfully disagrees for the same reason stated in the above discussion. As discussed above, Suzuki ‘638 does not teach a recess disposed immediately adjacent the emitter stack and the recess sharing a boundary with the emitter stack. Suzuki’s recess is between two isolation regions. Thus, one of ordinary skill in the art would have derived to the device as described in claims 20, 28, and 29 using Suzuki. Therefore, Suzuki ‘638 does not make obvious Applicant’s claims 20, 28, and 29.

Claim 17 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Suzuki in view of U’ren (U.S. Patent No. 6,365,479, hereinafter “U’ren”).

Applicant respectfully disagrees for the same reason stated in the above discussion. As discussed above, Suzuki ‘638 does not teach a recess disposed immediately adjacent the emitter stack and the recess sharing a boundary with the emitter stack. Suzuki’s recess is between two isolation regions. Thus, one of ordinary skill in the art would have derived to claim 17 by combining Suzuki and U’ren.

Applicant respectfully submits that at least for the reasons above, Applicant's invention is patentable over the cited references.

Deposit Account Authorization

Authorization is hereby given to charge our Deposit Account No. 02-2666 for any charges that may be due. Furthermore, if an extension is required, then Applicant hereby requests such extension.

If the Examiner determines the prompt allowance of these claims could be facilitated by a telephone conference, the Examiner is invited to contact Mimi Diemmy Dao at (408) 720-8300.

Respectfully submitted,

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EXHIBIT A

Figure 1:

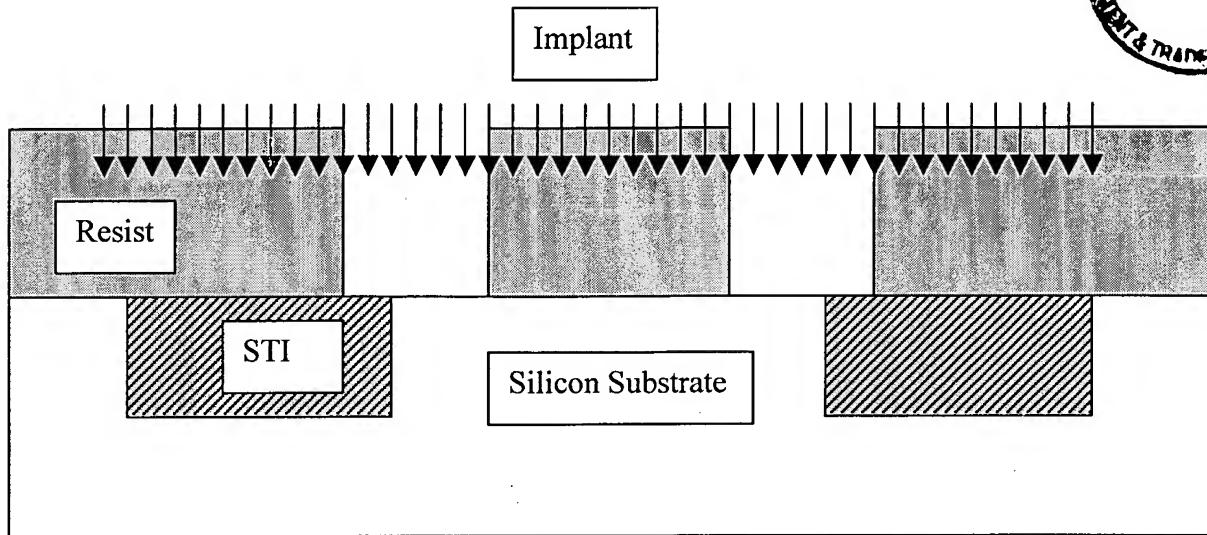


Figure 2:

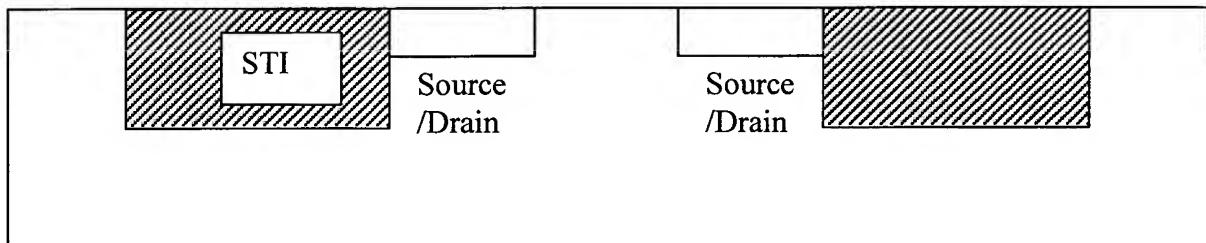




Figure 3:

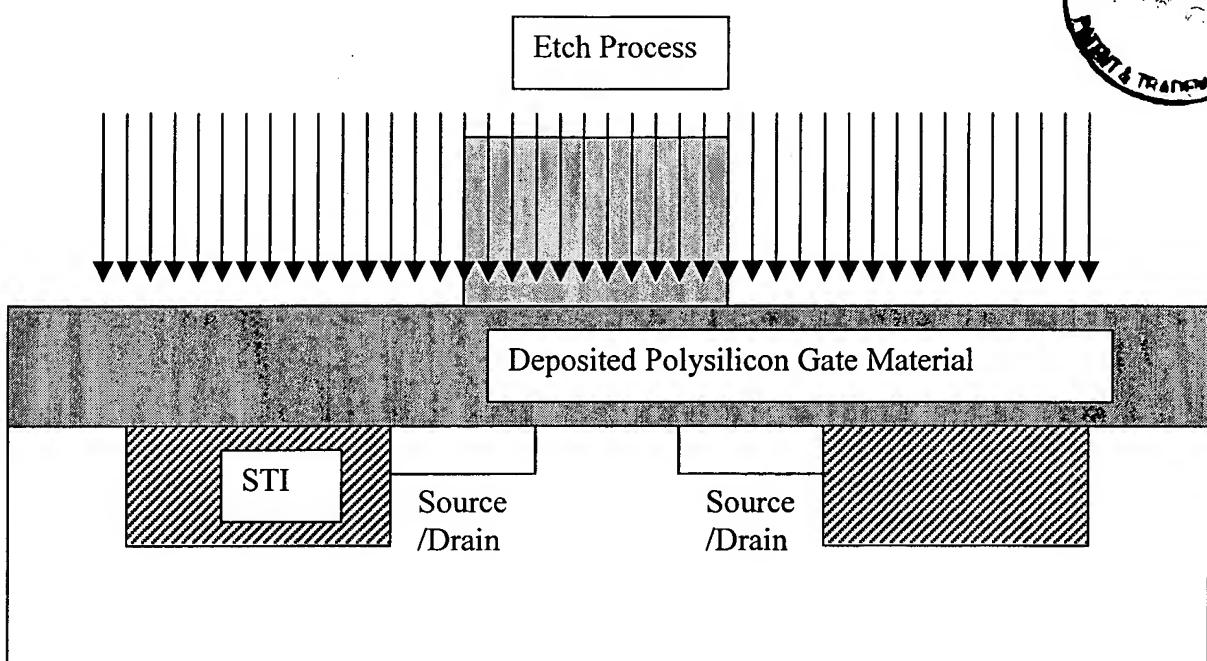


Figure 4:

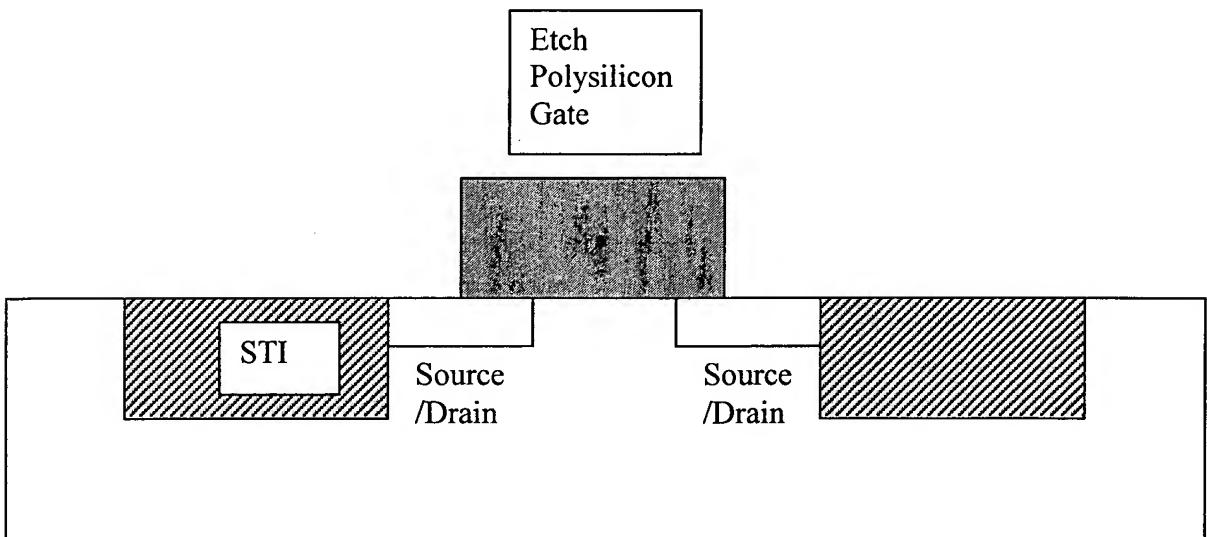


Figure 5:

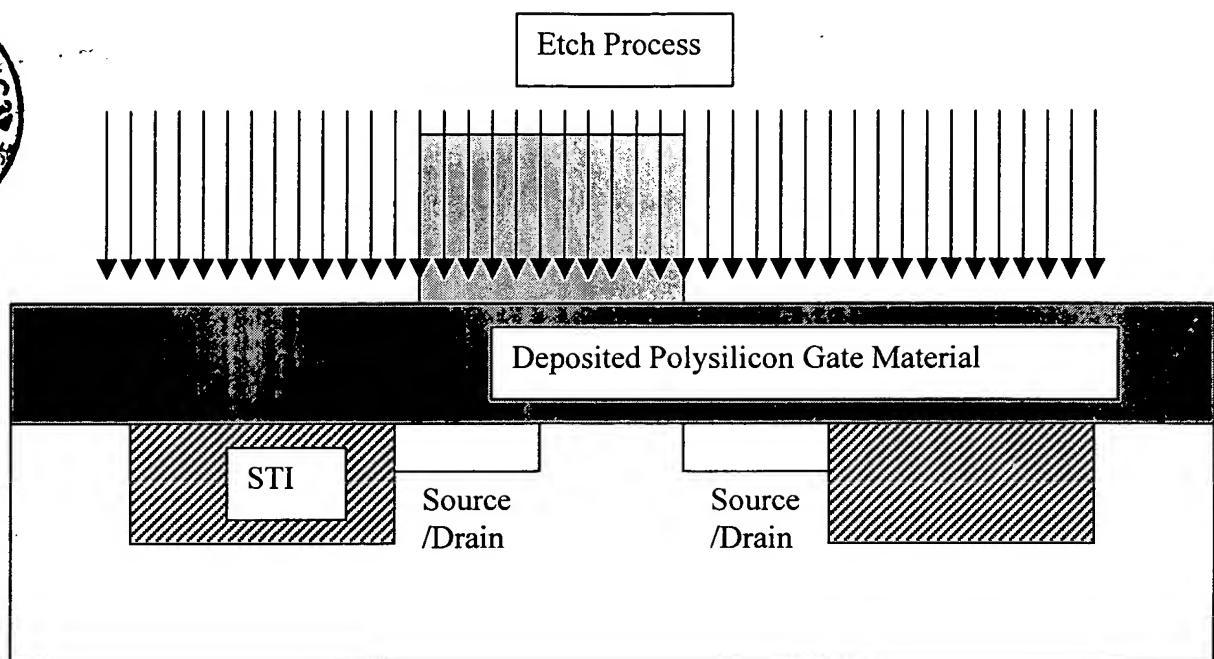


Figure 6:

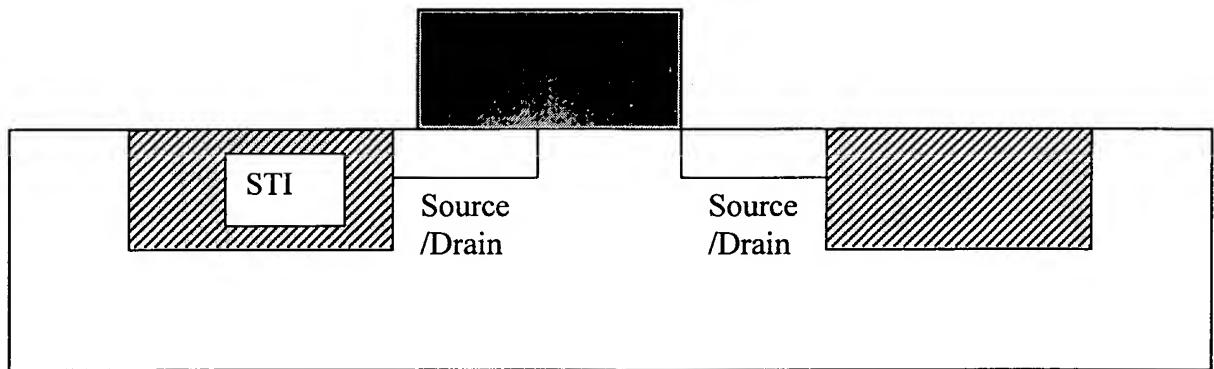
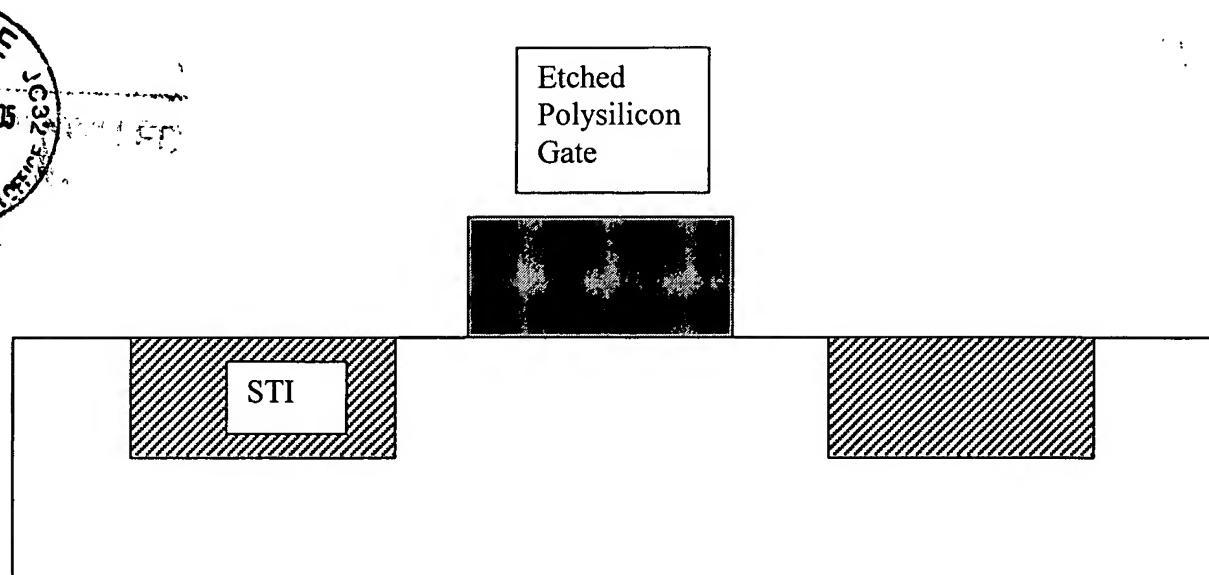


Figure 7:



The Source/Drain implant now is a very "loose" masking step with a lot of margin for miss-alignment and no implications

Figure 8:

